



Jacobsen syndrome

Jacobsen syndrome is a condition caused by a loss of genetic material from chromosome 11. Because this deletion occurs at the end (terminus) of the long (q) arm of chromosome 11, Jacobsen syndrome is also known as 11q terminal deletion disorder.

The signs and symptoms of Jacobsen syndrome vary considerably. Most affected individuals have delayed development, including the development of speech and motor skills (such as sitting, standing, and walking). Most also have cognitive impairment and learning difficulties. Behavioral problems have been reported, including compulsive behavior (such as shredding paper), a short attention span, and easy distractibility. Many people with Jacobsen syndrome have been diagnosed with attention deficit-hyperactivity disorder (ADHD). Jacobsen syndrome is also associated with an increased likelihood of autism spectrum disorders, which are characterized by impaired communication and socialization skills.

Jacobsen syndrome is also characterized by distinctive facial features. These include small and low-set ears, widely set eyes (hypertelorism) with droopy eyelids (ptosis), skin folds covering the inner corner of the eyes (epicanthal folds), a broad nasal bridge, downturned corners of the mouth, a thin upper lip, and a small lower jaw. Affected individuals often have a large head size (macrocephaly) and a skull abnormality called trigonocephaly, which gives the forehead a pointed appearance.

More than 90 percent of people with Jacobsen syndrome have a bleeding disorder called Paris-Trousseau syndrome. This condition causes a lifelong risk of abnormal bleeding and easy bruising. Paris-Trousseau syndrome is a disorder of platelets, which are blood cell fragments that are necessary for blood clotting.

Other features of Jacobsen syndrome can include heart defects, feeding difficulties in infancy, short stature, frequent ear and sinus infections, and skeletal abnormalities. The disorder can also affect the digestive system, kidneys, and genitalia. The life expectancy of people with Jacobsen syndrome is unknown, although affected individuals have lived into adulthood.

Frequency

The estimated incidence of Jacobsen syndrome is 1 in 100,000 newborns. More than 200 affected individuals have been reported.

Genetic Changes

Jacobsen syndrome is caused by a deletion of genetic material at the end of the long (q) arm of chromosome 11. The size of the deletion varies among affected individuals, with most affected people missing 5 million to 16 million DNA building blocks (also written as 5 Mb to 16 Mb). In almost all affected people, the deletion includes the tip of chromosome 11. Larger deletions tend to cause more severe signs and symptoms than smaller deletions.

The features of Jacobsen syndrome are likely related to the loss of multiple genes on chromosome 11. Depending on its size, the deleted region can contain from about 170 to more than 340 genes. Many of these genes have not been well characterized. However, genes in this region appear to be critical for the normal development of many parts of the body, including the brain, facial features, and heart. Only a few genes have been studied as possible contributors to the specific features of Jacobsen syndrome; researchers are working to determine which additional genes may be associated with this condition.

Inheritance Pattern

Most cases of Jacobsen syndrome are not inherited. They result from a chromosomal deletion that occurs as a random event during the formation of reproductive cells (eggs or sperm) or in early fetal development. Affected people typically have no history of the disorder in their family, although they can pass the chromosome deletion to their children.

Between 5 and 10 percent of people with Jacobsen syndrome inherit the chromosome abnormality from an unaffected parent. In these cases, the parent carries a chromosomal rearrangement called a balanced translocation, in which a segment from chromosome 11 has traded places with a segment from another chromosome. In a balanced translocation, no genetic material is gained or lost. Balanced translocations usually do not cause any health problems; however, they can become unbalanced as they are passed to the next generation.

Children who inherit an unbalanced translocation can have a chromosomal rearrangement with some missing genetic material and some extra genetic material. Individuals with Jacobsen syndrome who inherit an unbalanced translocation are missing genetic material from the end of the long arm of chromosome 11 and have extra genetic material from another chromosome. These chromosomal changes result in the health problems characteristic of this disorder.

Other Names for This Condition

- 11q deletion disorder
- 11q deletion syndrome
- 11q- deletion syndrome

- 11q terminal deletion disorder
- 11q23 deletion disorder
- Jacobsen thrombocytopenia

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: 11q partial monosomy syndrome
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0795841/>

Other Diagnosis and Management Resources

- 11q Research & Resource Group: Concerns and Recommendations
<http://www.11qusa.org/whatis/recommendations.htm>
- Unique: Chromosome 11q Deletion Disorder: Jacobsen Syndrome
<http://www.rarechromo.org/information/Chromosome%2011/11q%20deletion%20disorder%20Jacobsen%20syndrome%20FTNW.pdf>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Health Topic: Developmental Disabilities
<https://medlineplus.gov/developmentaldisabilities.html>
- Health Topic: Platelet Disorders
<https://medlineplus.gov/plateletdisorders.html>

Genetic and Rare Diseases Information Center

- Jacobsen syndrome
<https://rarediseases.info.nih.gov/diseases/307/jacobsen-syndrome>

Educational Resources

- Disease InfoSearch: Jacobsen syndrome1
<http://www.diseaseinfosearch.org/Jacobsen+syndrome1/3893>
- MalaCards: jacobsen syndrome
http://www.malacards.org/card/jacobsen_syndrome
- March of Dimes: Chromosomal Conditions
<http://www.marchofdimes.org/baby/chromosomal-conditions.aspx>
- Orphanet: Jacobsen syndrome
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=2308
- Orphanet: Paris-Trousseau thrombocytopenia
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=851
- The Craniofacial Center: Single Suture Craniosynostoses
http://thecraniofacialcenter.com/synostoses_treatment.html
- Unique: Chromosome 11q Deletion Disorder: Jacobsen Syndrome
<http://www.rarechromo.org/information/Chromosome%2011/11q%20deletion%20disorder%20Jacobsen%20syndrome%20FTNW.pdf>

Patient Support and Advocacy Resources

- 11q Research & Resource Group
<http://www.11qusa.org/>
- Chromosome Disorder Outreach
<http://chromodisorder.org/>
- National Organization for Rare Disorders (NORD)
<https://rarediseases.org/rare-diseases/chromosome-11-partial-monosomy-11q/>
- Unique Rare Chromosome Disorder Support Group
<http://www.rarechromo.org/>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28jacobsen+syndrome%5BTIAB%5D%29+OR+%2811q+deletion+syndrome%5BTIAB%5D%29+OR+%2811q+terminal+deletion+disorder%5BTIAB%5D%29+OR+%2811q+deletion+syndrome%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

OMIM

- JACOBSEN SYNDROME
<http://omim.org/entry/147791>

Sources for This Summary

- Akshoomoff N, Mattson SN, Grossfeld PD. Evidence for autism spectrum disorder in Jacobsen syndrome: identification of a candidate gene in distal 11q. *Genet Med*. 2015 Feb;17(2):143-8. doi: 10.1038/gim.2014.86. Epub 2014 Jul 24.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/25058499>
- Coldren CD, Lai Z, Shragg P, Rossi E, Glidewell SC, Zuffardi O, Mattina T, Ivy DD, Curfs LM, Mattson SN, Riley EP, Treier M, Grossfeld PD. Chromosomal microarray mapping suggests a role for BSX and Neurogranin in neurocognitive and behavioral defects in the 11q terminal deletion disorder (Jacobsen syndrome). *Neurogenetics*. 2009 Apr;10(2):89-95. doi: 10.1007/s10048-008-0157-x. Epub 2008 Oct 15.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/18855024>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3050515/>
- Favier R, Akshoomoff N, Mattson S, Grossfeld P. Jacobsen syndrome: Advances in our knowledge of phenotype and genotype. *Am J Med Genet C Semin Med Genet*. 2015 Sep;169(3):239-50. doi: 10.1002/ajmg.c.31448. Epub 2015 Aug 18. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/26285164>
- Grossfeld PD, Mattina T, Lai Z, Favier R, Jones KL, Cotter F, Jones C. The 11q terminal deletion disorder: a prospective study of 110 cases. *Am J Med Genet A*. 2004 Aug 15;129A(1):51-61.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15266616>
- Mattina T, Perrotta CS, Grossfeld P. Jacobsen syndrome. *Orphanet J Rare Dis*. 2009 Mar 7;4:9. doi: 10.1186/1750-1172-4-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/19267933>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2670819/>
- Penny LA, Dell'Aquila M, Jones MC, Bergoffen J, Cunniff C, Fryns JP, Grace E, Graham JM Jr, Kousseff B, Mattina T, et al. Clinical and molecular characterization of patients with distal 11q deletions. *Am J Hum Genet*. 1995 Mar;56(3):676-83.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/7887422>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1801184/>
- Tyson C, Qiao Y, Harvard C, Liu X, Bernier FP, McGillivray B, Farrell SA, Arbour L, Chudley AE, Clarke L, Gibson W, Dyack S, McLeod R, Costa T, Vanallen MI, Yong SL, Graham GE, Macleod P, Patel MS, Hurlburt J, Holden JJ, Lewis SM, Rajcan-Separovic E. Submicroscopic deletions of 11q24-25 in individuals without Jacobsen syndrome: re-examination of the critical region by high-resolution array-CGH. *Mol Cytogenet*. 2008 Nov 11;1:23. doi: 10.1186/1755-8166-1-23.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/19000322>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2648978/>

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<https://ghr.nlm.nih.gov/condition/jacobsen-syndrome>

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